

CASE REPORT**PATHOLOGY/BIOLOGY**

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Death by Ram Attack: A Case Report from Greece and a Brief Review of the Literature

ABSTRACT: A case of a ram attack that caused injuries to a 73-year-old man is presented. The deceased survived the attack and had the opportunity to speak with a friend over the phone before being transferred to the hospital. After a 21-day hospitalization, the patient passed away. A postmortem examination was performed to ascertain the cause of death. The autopsy findings are presented along with a brief review of the literature. Attacks by agricultural animals (or livestock) around the world are reported in the scientific literature. Fatalities from ram attacks are extremely rare. The need to implement specific codes in the ICD system, relevant to each animal attack, appears to be of great importance, in order to allow tracking of animal-related deaths.

KEYWORDS: forensic science, forensic medicine, animal attacks, sheep, chest injuries, autopsy

Attacks by wildlife animals worldwide are reported in scientific literature, especially in countries with agricultural production and woodlands. Attacks by domesticated animals, on the contrary, are uncommon due to the nature of their domestication. Nevertheless, attacks by nonvenomous animals remain a major public health issue and can inflict fatal injuries to the victims. For example, while dog bites are fairly common, fatal attacks by dogs are quite uncommon but certainly not inexistent. These injuries can be divided into two main categories, based on the mechanism of death: blunt force injuries and penetrating injuries (1).

Ram attacks are infrequent events, and thus, fatalities from such attacks are extremely rare. These animals usually inflict blunt force injuries to their victims, and mortality depends on the affected region of the body.

In this report, we present a case of a ram attack that caused injuries at a 73-year-old man.

Case Report

On an August morning, a 73-year-old man, decided to prune the fig and lemon trees that he grew at a small rural village located in southern Greece. As he was approaching his field, under unknown circumstances, a ram attacked him, hitting him at the right side of the thorax and at the right subcostal area. The exact circumstances of the incident are unclear, as no witness was present; however, it is reported, that minutes following the event, a neighbor was called

by the man. He briefly informed him about the incident and he complained of chest discomfort. As symptoms got worse, he was transferred by ambulance to the nearest general hospital, which is located at a distance of about 36 km away (approximately one hour of driving).

During clinical examination, subcutaneous emphysema and bruises at the right side of the thorax were observed. Radiographic examination revealed right-sided pneumothorax, multiple bilateral fractures at most of the ribs, along with fracture of the sternum and the right scapula. A right-sided chest drainage was immediately inserted, and the patient was transferred to a general hospital in Attica (Athens Metropolitan Area), which specializes in the rehabilitation of the injured. A few hours after hospital admission, the patient lost consciousness and was subsequently transferred to the intensive care unit (ICU), where mechanical ventilation was applied. The patient never regained consciousness, and a few days later, he developed systemic inflammatory response syndrome. After 21 days of hospitalization, he passed away.

Autopsy Findings

An autopsy was performed, at the Department of Forensic Medicine and Toxicology of the Medical School of the National and Kapodistrian University of Athens. The height of the deceased was measured 176 cm.

During external examination, we observed one bruise, measuring approximately 6 cm in diameter on the right mammary area, one abrasion, measuring approximately 0.5 cm on the right infraclavicular area, one bruise, measuring approximately 4 cm in diameter on the right subchondral area, and finally one bruise, measuring approximately 6 cm in diameter on the right side of the abdominal wall. The already-mentioned bruises had a faint yellowish pigmentation and were in resolution stage. Thus, according to our opinion, their age is compatible with the stated time of the incident.

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Furthermore, the skin of the deceased presented with a yellowish hue (probably jaundice due to liver failure). Unfortunately, the antemortem biochemistry test results were not available to our department; thus, we were not able to distinguish whether jaundice was prehepatic, hepatic, or posthepatic. Nevertheless, the degree of fatty infiltration of the liver was severe and this, combined with injury-induced stress, could possibly provide an adequate explanation of the icterus.

Finally, generalized subcutaneous edema was noted, possibly due to renal failure. Once again, the antemortem biochemistry test results were unavailable, but the degree of disruption of renal architecture could provide an explanation compatible with the provided clinical information (renal failure).

During internal examination of thoracic cavity, the left lung was atelectatic. Upon dissection, lungs appeared with a "greenish" hue and flow of pus was noted. The lung lesions did not appear to be focal in nature, thus suggesting a generalized infiltration of the pulmonary parenchyma.

Furthermore, multiple fractures of the ribs were ascertained. Specifically, seven ribs of right hemithorax (from third to ninth rib) presented with fractures of the vertebral end. The first nine ribs of left hemithorax presented with fractures of the sternal end.

Heart weighed 350 g and did not present findings compatible with significant coronary disease.

Upon dissection of the abdominal cavity, moderate ascites was found. Macroscopic examination of the liver revealed significant fatty degeneration. Multifocal random arterial infarcts were present in the small bowel. The renal surfaces were diffusely microgranular.

Based on autopsy findings combined with medical history, cause of death was defined as multiple organ failure due to chest injuries caused by ram attack.

According to our opinion, the associated with multiple organ failure signs include the icteric hue of the skin (liver failure), the generalized subcutaneous edema (renal failure), the random multifocal infarcts of the intestine (heart failure), and the lesions observed on the lungs (atelectasis).

Most possibly, the preexisting pathology (fatty liver, diffusely microgranular renal surfaces) was exacerbated by the trauma inflicted by the ram attack. The patient, according to the clinical information provided, developed sepsis and subsequently multi-organ failure.

Discussion

Nowadays, fatal injuries by ram attack appear to be extremely rare incidents, thus hindering the experience required for their medicolegal investigation. Only eleven cases are reported in the literature, in which death was attributed to blunt force injuries and one more, in which death was classified as an accident during shearing (2–9).

The first report was from Finland in 1973, mentioning a case of death by ram attack, in a total of 63 deaths caused by domestic animals (2). In 1987, a report from England and Wales presented a total of five deaths caused by ram attack, mainly due to injuries located in the thorax (3). In 1989, in a report from Sweden, a ram attack appears to have caused death by head injury (4). In 2001, a major US study concerning occupational fatalities due to animal-related events, included just one case of death related to sheep, in a total of 350 cases, without providing any further details regarding the circumstances of the incident (5). In 2007, a report from New Mexico

presented two cases of fatal injuries caused by ram attack. More specifically, injuries were found on the head, the neck, and the extremities of the victims (6). In 2013, a report from Serbia presented an attack from a 100-kg hornless ram that inflicted multiple head and chest injuries in a 78-year-old woman (7). In 2015, another fatality by a hornless ram was reported, this time in Croatia. The blunt force injuries, that caused death, were located on the head, thorax, and the upper extremities (8). Finally, a bizarre accidental death involving sheep shearing was reported in Australia, when a sheep kicked the shear out of the hand of a 29-year-old man, causing him a lethal incision wound on the neck (9).

Apparently, fatalities due to incidents involving ram attacks are not frequent. Furthermore, it appears that even serious, non-fatal, injuries inflicted by these animals are also extremely rare (10). Possibly nonserious, nonfatal, injuries due to contact with such animals happen more frequently than they are reported.

This is probably due to the tranquil nature of these animals. In general, sheep tend to move away from danger. Nevertheless, they can also express some aggression in various ways, mainly as a response to the invasion of their personal field, especially the male ones (rams) (11).

The most common aggressive behavior is an act of pushing the "victim" with their head (butting), which is thickened and can serve both in offensive or defensive manner (11,12).

Besides attacking the victim, sheep, goats, and rams may threaten the victim in many other ways, such as "rushing" and rearing their hind legs (12). These animals may headbutt the victim repeatedly. They may also kick the victim with their legs, and in many cases, a ram may back up and run to the victim, in order to develop high speed and to maximize the impact strength (8).

In our case, the exact circumstances of the incident were unknown, as no eyewitness was present. The friend of the deceased, with whom the victim spoke over the phone prior to the hospitalization, was interviewed by our department. He reported that the victim was attacked by a ram, but further details were not provided.

The height of the deceased was measured during the PME to be 176 cm. The average wither height of a ram coming from a sheep breed indigenous to Greece usually is about 76 cm (13). The relative size of our victim to an average height ram is illustrated in Fig. 1A.

According to our opinion, the only possible way a ram could inflict injuries so high on the thorax is that the victim had to be leaning forward, possibly to reach for an object from the ground to repel the upcoming attack (Fig. 1B). We calculated that a drop of 50–60 cm in the height of the victim (by leaning forward) can allow a ram to reach this high on the thoracic wall.

The scenario, in which the victim was brought down and then stepped upon, was quickly dismissed, as it was not compatible with the external injuries observed during the PME.

In contrary to the other case reports mentioned above, in our case the victim did not sustain any significant external injuries that could justify immediate death.

In accordance with above-mentioned case reports, the injuries in our case were located mainly on the thorax. Though the detailed records of the relevant hospitalization were not available to our department, however after careful evaluation of autopsy finding, it is only fair to assume that the victim presented flail chest shortly after the attack.

The victim was immediately hospitalized and treated, but eventually he died due to injury-related complications.

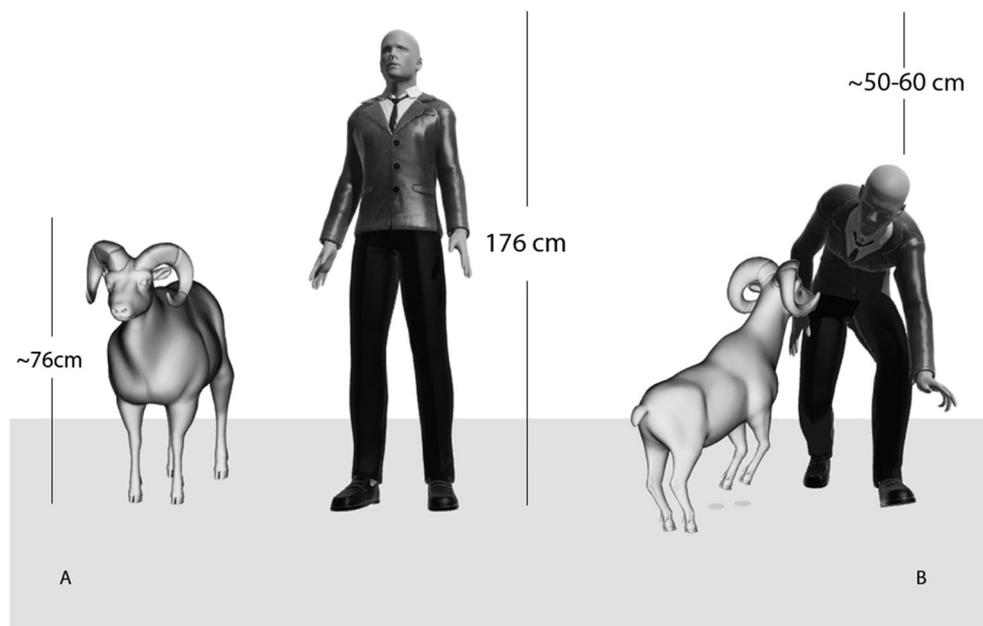


FIG. 1—(A) The size of our victim (176 cm) in relation to the average wither height of a ram (approximately 76 cm) is demonstrated. (B) The possible position of the victim and of the ram, prior to the incident is illustrated. Please note the drop of the height of the victim, by 50–60 cm, that allows the ram to reach the thorax.

It seems that some degree of underlying pathology of the victim, that existed prior to the incident (e.g., liver steatosis, hypertension), may have contributed to the development of the multiple organ failure which finally lead to death. Nevertheless, had it not happened, the ram attack, this preexisting pathology could not readily cause death.

Thus, it is only logical to assume that the injuries caused by the ram attack (mainly the internal injuries) are in fact the initial cause of death of our victim. Subsequently, it is evident that death following a ram attack can therefore be either immediate or late.

In general, both the circumstances and the mechanism of death hold great importance in the medicolegal investigation, especially when the deceased is found near a domestic animal farm. As already mentioned, the investigation of fatalities due to animal attacks, especially livestock, is by its nature, extremely difficult. The limited relevant experience of the average forensic pathologist significantly worsens the ability to successfully handle such cases.

In most cases, there are no witnesses, limiting the information provided prior to the onset of the PME. According to our opinion, a careful death scene investigation can prove to be extremely helpful, thus allowing to safely rule out the possibility of a homicide.

The value of a careful death scene investigation is demonstrated in the case reported by Irandoust et al., in which the discovery of the electric shears, of the blood splatter, and of the partially shorn sheep solved the mystery (3). This also applies to the case reported by Murray and Sivaloganathan, in which death was ascertained to have been caused by a ram attack, as human blood was found on the neck and on the nose of the ram (9).

Male individuals, especially older ones, seem to be at greater risk for animal-related deaths (4–6). Better education for individuals that are involved with farm animals is necessary, in order to minimize human nonfatal and fatal injuries. Concerning sheep, a study from Australia has shown that several human (and

nonhuman) acts may result in fear and stress, that incite animal response, that in our opinion could increase the risk of aggressive behavior (14).

In order to track animal-related fatalities, as Langley has already expressed, it is important to create specific codes in International Classification of Disease reporting system for each animal attack, especially for mammals, or at least create codes for groups of animals, such as farm animals and wild animals. The revised ICD-11 the PE11 code includes assaults by being struck, kicked, or bumped by animal, the PE13 includes assaults by being crushed or stepped on by animal, and in both of these codes, there are options to select the animal that produced injury, the place that the incident occurred, and the activity when injured (5,15).

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